

CLAIMS

1. A turbine nozzle comprising:
 - a hollow vane having opposite pressure and suction sides extending in span between opposite outer and inner bands and extending in chord between opposite leading and trailing edges;
 - said pressure and suction sides being imperforate except for a row of trailing edge outlets extending through said pressure side adjacent said trailing edge;
 - said outer band having an outer plenum including an inlet for receiving compressed air, and said inner band having an inner plenum including an outlet, and an aft flange spaced from said inner plenum to define an aft recess outside said inner plenum;
 - said vane further including forward, aft, and middle flow channels extending between said outer and inner bands;
 - said forward channel being disposed behind said leading edge in flow communication with said outer and inner plenums;
 - said middle channel being disposed behind said forward channel in flow communication with said outer and inner plenums; and
 - said aft channel being disposed behind said middle channel in front of said trailing edge in flow communication with said outer plenum, said trailing edge outlets, and said aft recess.
2. A nozzle according to claim 1 wherein:
 - said outer band includes forward, aft, and middle aperture inlets joining said outer plenum in flow communication with said forward, aft, and middle channels, respectively; and
 - said inner band includes forward, aft, and middle aperture outlets joining in flow communication said forward and middle channels with said inner plenum, and said aft channel with said aft recess outside of said inner plenum.
3. A nozzle according to claim 2 wherein:
 - said middle channel is chordally longer than said forward channel and said aft

channel; and

said vane further includes a middle bridge splitting said middle channel into two legs extending in span between said outer and inner bands, and integrally joining together said pressure and suction sides therealong.

4. A nozzle according to claim 3 wherein:
said middle bridge is joined to said outer band and terminates short of said inner band;
said outer band includes two middle inlets at said two middle legs; and
said inner band includes a common middle outlet at said middle channel below said two legs.
5. A nozzle according to claim 4 wherein said forward, middle, and aft channels are separated by imperforate bridges for confining flow of pressurized air between said outer and inner bands.
6. A nozzle according to claim 5 wherein:
said forward and middle outlets in said inner band are sized to meter flow of said air from said forward and middle channels; and
said aft inlet in said outer band is sized to meter flow of said air into said aft channel.
7. A nozzle according to claim 6 wherein inlet in said outer plenum includes a tubular outer spoolie, and said outlet in said inner plenum includes a tubular inner spoolie.
8. A nozzle according to claim 7 wherein:
said forward and middle channels include turbulators along internal surfaces of said pressure and suction sides; and
said aft channel is devoid of turbulators.
9. A nozzle according to claim 7 further comprising a plurality of said vanes joined at opposite ends to said outer and inner bands, with each of said vanes being disposed in flow

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communication with said outer and inner plenums.

10. A nozzle according to claim 7 in combination with a high pressure turbine disposed upstream of said nozzle, and a low pressure turbine disposed downstream of said nozzle.

11. A turbine nozzle comprising:

a plurality of hollow vanes joined at opposite ends to radially outer and inner bands;

said outer band having an outer plenum including an inlet for receiving compressed air, and said inner band having an inner plenum including an outlet;

each of said vanes including opposite pressure and suction sides joined together at opposite leading and trailing edges, a forward flow channel extending behind said leading edge, an aft flow channel extending in front of said trailing edge, and a middle flow channel disposed between said forward and aft channels; and

said forward, aft, and middle channels being disposed in flow communication with said outer plenum for receiving said air therefrom, said forward and middle channels being disposed in flow communication with said inner plenum for discharging said air thereto, and said aft channel extending through said inner band outside said inner plenum for discharging said air.

12. A nozzle according to claim 11 wherein each of said vanes further comprises a row of trailing edge outlets extending through said vane pressure side adjacent said trailing edge in flow communication with said aft channel.

13. A nozzle according to claim 12 wherein:

said outer band includes forward, aft, and middle aperture inlets joining said outer plenum in flow communication with said forward, aft, and middle channels, respectively; and

said inner band includes forward, aft, and middle aperture outlets joining in flow communication said forward and middle channels with said inner plenum, and said aft channel with said outside of said inner plenum.

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14. A nozzle according to claim 13 wherein:
said middle channel is chordally longer than said forward channel and said aft channel; and
each of said vanes further includes a middle bridge splitting said middle channel into two legs extending in span between said outer and inner bands, and integrally joining together said pressure and suction sides therealong.
15. A nozzle according to claim 14 wherein:
said middle bridge is joined to said outer band and terminates short of said inner band;
said outer band includes two middle inlets at said two middle legs; and
said inner band includes a common middle outlet at said middle channel below said two legs.
16. A nozzle according to claim 14 wherein said pressure and suction sides are imperforate along both said forward and middle channels for confining said air between said outer and inner plenums.
17. A nozzle according to claim 14 wherein:
said forward and middle outlets in said inner band are sized to meter flow of said air from said forward and middle channels; and
said aft inlet in said outer band is sized to meter flow of said air into said aft channel.
18. A nozzle according to claim 14 wherein inlet in said outer plenum includes a tubular outer spoolie, and said outlet in said inner plenum includes a tubular inner spoolie.
19. A nozzle according to claim 14 wherein:
said inner band further includes an aft flange spaced from said inner plenum to define an aft recess; and
said aft outlets are disposed through said inner band in flow communication with said aft recess for discharging said air therein at a pressure less than pressure of said air discharged

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into said inner plenum from said forward and middle channels.

20. A nozzle according to claim 14 wherein:
said forward and middle channels include turbulators along internal surfaces of said pressure and suction sides; and
said aft channel is devoid of turbulators.

21. A nozzle according to claim 14 in combination with a high pressure turbine disposed upstream of said nozzle, and a low pressure turbine disposed downstream of said nozzle.